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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,769	04/19/2005	Marco Romagnoli	05788.0318	3559
22852	7590	06/30/2006	EXAMINER	
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			WONG, TINA MEI SENG	
			ART UNIT	PAPER NUMBER
			2874	

DATE MAILED: 06/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/506,769

Applicant(s)

ROMAGNOLI ET AL.

Examiner

Tina M. Wong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 03 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 15-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-20, 26 and 27 is/are rejected.
- 7) ☒ Claim(s) 21-25 and 28 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 4 IDS statements.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Priority*

Receipt is acknowledged of papers submitted by the International Bureau under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Claim Objections*

Claim 16 recites the limitation "said second input optical waveguide" on Line 2. There is insufficient antecedent basis for this limitation in the claim. Previously, claim 15 recites a second optical waveguide. The Examiner believes claim 15 intends to claim "a second input optical waveguide" and will be examined as a second input optical waveguide. Appropriate correction is required.

Claim 21 recites the limitation "said first and second directions" on Line 1. There is insufficient antecedent basis for this limitation in the claim. Previously, claim 15 recites a first and second axis. The Examiner believes claim 21 intends to claim, "said first and second axis" and will be examined as a second input optical waveguide. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

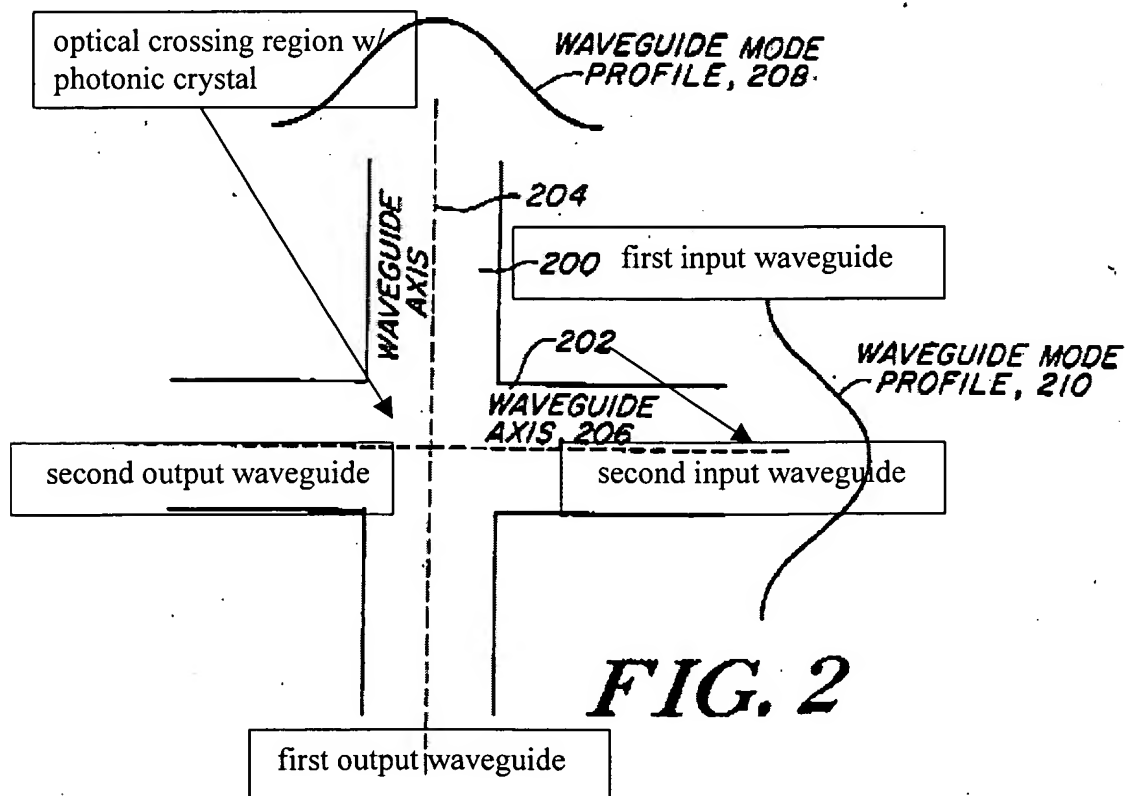
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 15-20 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by U.S. Patent 6, 198,860 to Johnson et al.**

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In regards to claim 15, Johnson et al discloses a device for crossing optical beams comprising at least a first input optical waveguide (200) directed along a first axis (204) and a second optical waveguide (202) directed along a second axis (206) including with respect to the first axis, an optical crossing region at the intersection of the first and second axis (Figure 2, Abstract) and a photonic crystal (Figure 6b) having a regular periodicity in the optical crossing region (Column 6, Lines 35-65).

In regards to claim 16, although Johnson et al does not explicitly state the waveguides to have input and output sections, it is clearly shown in Figure 2 for the device to have a first and second output optical waveguide opposite of the first and second input optical waveguide with respect to the crossing region and directed along the first and second axis respectively.



In regards to claim 17, Johnson et al shows the first and second axis having the same direction as the first and second crystal axis, respectively. (Figure 2 and Figure 8a, b, c)

In regards to claim 18, Johnson et al shows the first and second axis to be perpendicular to each other.

In regards to claim 19, Johnson et al discloses the photonic crystals to extend in a square or rectangular portion of an optical integrated structure and wherein the first and second optical input waveguides are coupled to the respective edges of the portion. (Figure 2 and Figure 8a, b, c)

In regards to claim 20, Johnson et al shows the photonic crystal to have a period array of holes arranged according to a square geometry.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6, 198,860 to Johnson et al as applied to claim 15 above.**

In regards to claim 26, although Johnson et al does not specifically disclose the first and second input waveguides are integrated waveguides, however, from Figures 8a, b, c and 12b, it can be observed from the figures that the waveguides are integrated into the photonic slab.

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Therefore, although not explicitly stated, Johnson et al does show the first and second input waveguides to be integrated waveguides.

**Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6, 198,860 to Johnson et al as applied to claim 15 above, in view of U.S. Patent Application Publication 2005/0271318 to Takiguchi et al.**

In regards to claim 27, Johnson et al discloses all discussed above, but fails to specifically disclose the first and second input optical waveguides to be optical fibers. However, in order for the defect section carrying the signal to be transmitted and not lost, an optical component capable of carrying an optical signal must be coupled to the defect waveguide section. Takiguchi et al shows in Figure 1 a core and cladding optical fiber configuration capable of transmitting and receiving a signal from a photonic crystal device. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have included an optical fiber as the first and second input optical waveguides in order to transmit and receive a signal.

***Allowable Subject Matter***

**Claims 21-25 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.**

In regards to claims 21-25, the prior art of record fails to disclose or reasonably suggest all of the limitations of the base claim (claim 15) and any intervening claims (none), but more specifically, the prior art fails to disclose or reasonably suggest the first and second axis directions to be defined by an angle of  $\Pi/3$  which is  $60^\circ$ . All of the prior art cited by the

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Examiner, relied upon by the Examiner and submitted by Applicant only suggest a rectangular/square photonic lattice configuration showing a perpendicular direction of the two axis directions. See U.S. Patent 6,684,008 to Young et al, Figure 5 as another example of a perpendicular axis direction.

In regards to claim 28, the prior art of record fails to disclose or reasonably suggest all of the limitations of the base claim (claim 15) and any intervening claims (none), but more specifically fails to disclose or reasonably suggest the dimensions of the regions and periods of the array are related so that starting from an isotropic distribution of the wave vectors of the electromagnetic radiation within a first angular range that is twice the angular extension of the first irreducible Brillouin zone of the photonic crystal and the group velocity vectors corresponding to said wave vectors are rearranged during propagation in said photonic crystal that at least 50% of the group velocity vectors are directed within a second angular range that is about one-third of said first angular range and the width at half- maximum of the distribution of the modules of the velocity group vectors is lower than about two-thirds of said second angular range.

#### ***Prior Art***

The documents submitted by applicant in the Information Disclosure Statements have been considered and made of record. Note attached copies of forms PTO-1449. None of the documents submitted by Applicant discloses or reasonably suggest the allowable subject matter discussed above.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference B discusses a photonic circuit device with two input and output ports.

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Although References D and E are pertinent to Applicant's disclosure, discussing similar photonic crystal and waveguide structures, neither reference provides a sufficient date to be relied upon and applied as a prior art reference.

### ***Inventorship***

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

### ***Conclusion***

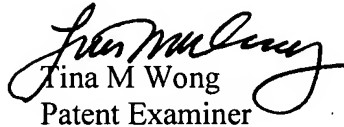
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tina M. Wong whose telephone number is (571) 272-2352. The examiner can normally be reached on Monday-Friday 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Tina M Wong  
Patent Examiner